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SMALL FARM *digest*

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New Opportunities in the Emerging Biobased Economy

A quiet movement is changing America's industrial materials base from an economy based on geology to one based on biology.

In the shift, agriculture is providing the biological raw materials to make consumer and industrial products, using carbohydrates from plants, proteins from animal by-products, and fatty acids from seeds. U.S. agriculture will continue to be the world's most productive as new value-added marketing opportunities for non-food products open up in this emerging biobased economy.

Historical Forces Drive Industry. By the turn of the 20th century, powerful new technologies allowed petroleum to be efficiently collected and refined into diverse industrial raw materials and high performance products.

These new chemical materials successfully competed with older, biologically based materials, and eventually replaced them as the source for many non-food consumer products such as motor oil, cosmetics, and plastics. Petroleum was easier to obtain in large quantities and its products less expensive to manufacture.

Today new technologies, new laws, and a public increasingly concerned about environmental pollution tied to petroleum and other fossil-derived products are combining to reverse this century-old competition and accelerate the movement towards biofuels and biobased products.

Chemical companies are also investigating renewable biobased materials to replace petroleum-derived ingredients in their product lines to meet environmental regulations.

CONTINUED ON PG. 2.



Steve Lorimer (foreground), a Farragut, IA farmer and chair of the Iowa Soybean Promotion Board, applies a soy-based lubricant for semitrailer trucks at a press conference in Des Moines at which successful field testing of the biobased product was announced. At left foreground is Dr. Lou Honary, director of the Ag-Based Industrial Lubricants (ABIL) Research Program at the University of Northern Iowa.—PHOTO BY JAMES E. O'CONNOR, APR, UNIVERSITY OF NORTHERN IOWA.

Small Farm Success Story A Rural Enhancement Model for Our Times

Bringing a biobased product from laboratory research, field trials, and testing to commercialization involves a many-player partnership.

Because strategic alliances are focusing their resources on them, two agricultural communities in Colorado and Michigan are benefiting. The Alliance involves Colorado State University, Michigan State University, Agro Management Group Company (AGRO), USDA, the United Soybean Board, county extension agents, and farmers willing to try a new biobased crop venture.

The project involves transferring promising university research that has resulted in a viable biobased product to an agricultural community that is willing to organize to produce that new product.

Innovative farmers and ranchers willing to invest in a new biobased venture working with partners from industry, state universities, government programs, and local economic development entities are the keys to success.

The project involves manufacturing AMG 2000, a high-performance, environmentally friendly motor oil containing 17 different vegetable oils like soybean, canola, and sunflower, as well as vegetable and animal waxes like meadowfoam and lanolin. Ingredients are for the most part locally grown, processed, and sold through two farmer-owned corporations - creating jobs and leaving profits in local communities.

Four AGRO company representatives, including Jim Lambert, AGRO Chief Executive Officer (CEO), and Duane Johnson, a Colorado State University research scientist, have collaborated since 1992 on value-added possibilities for canola oil. Johnson's work set world yield records on improved canola production.

CONTINUED ON PG. 6.

Biobased materials, old and new, are produced from plants and animals. They are intrinsically renewable and, in most cases, earth-friendly—contrasted with petroleum products, which are intrinsically non-renewable and pollution-causing.

Innovators like Henry Ford and Tuskegee Institute's George Washington Carver pioneered biobased research. Carver developed hundreds of products from peanuts and sweet potatoes. Ford built a prototype biological car in 1941 using soybean, field straw, cotton linters, flax, slash pine, and bio-resin for the body. A blend of 85% gasoline and 15% corn-derived ethanol fueled the car.

World War II shortages briefly turned attention to homegrown biobased materials. Then oil prices dropped, petroleum engineering and industrial fermentation techniques advanced, and the petrochemical industry reigned supreme.

More recently, foreign oil supply fluctuations and rising gas prices dramatize America's vulnerable dependence on overseas oil sources. The finiteness of petroleum reserves is also a reality.

Alliances Develop Biobased Infrastructure. Across the agricultural sector this biobased economy is being powered by alliances among federal government programs, private industry, commodity groups, other private sector partners, and scientists in federal, state, university, and industry laboratories.

These visionaries are pioneering processing technologies to convert traditional and new agricultural crops, waste, residues, and animal by-products into new products, including biofuels. These technologies will lower manufacturing and consumer costs and improve efficiency and performance standards.

Potential industrial and home applications for biologically derived materials include alternative fuels, absorbents, adsorbents, adhesives, pesticides, fertilizers, detergents, coatings, paints, paper, inks, construction materials, personal care products, degradable polymers, insulation, new fibers, lubricants, packaging, pharmaceuticals, nutraceuticals, or veterinary products.

While most biobased products are still

more expensive to manufacture and buy than petroleum-derived counterparts, they are making market inroads.

Envision the Future. Farm-grown materials can replace petroleum and other fossil-derived materials as basic industrial ingredients for American and global industries. Some producers are already involved in ethanol plants, processing facilities, cooperatives, and for-profit corporations that are producing lucrative biobased products.

Plant-derived materials are renewable and readily available but bulky. To be cost-effective as industrial product materials, they must be processed locally. Regionally based processing facilities for biobased products can provide additional market outlets for farmers willing to try new crop and new product ventures, while stimulating sustainable, self-reliant rural economies.

Should you diversify your farm operation by growing some crops for industrial uses or converting animal by-products into a new biobased end product?

"The future of the global economy is biobased, and the future of American agriculture is to be the supplier of raw materials for that biobased economy," says Dr. Robert Armstrong, former executive director of USDA's Alternative Agriculture Research and Commercialization (AARC) Corporation, a unique venture capital firm in existence from 1992 to 1999.

AARC helped 60 rural companies commercialize innovative research leading to biobased products and transfer the technology to rural communities. Two examples are:

■ **Phenix™ Biocomposites, LLC**, is a limited liability corporation that manufactures Environ® biocomposite—a biobased product for the building industry through a partnership between a farmer-based cooperative—Phenix Mfg. Co.—and a product development and marketing company—Phenix Biocomposites, Inc. Made of soybeans and recycled paper in a patented process, Environ can replace hardwood and stone in flooring and furniture applications. The durable and beautiful marble-like material looks like—but is lighter

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than—granite and is harder than oak.

- Citra-Solv, America's No. 1 home and industrial cleaner in the natural products industry, contains natural solvents from citrus peels, rather than petroleum solvents. Citrus peels were previously discarded as waste by Florida citrus growers, who now extract extra value at processing plants. Citra-Solv—marketed by Shadow Lake, a family-owned company—received the Edison Award for Environmental Achievement.

Other biobased product success stories include:

- West Central Cooperative in Iowa produces raw materials for and manufactures BioSOY, SoyLINK, and SoyTRUK, a product line of soy-based industrial lubricants. The research behind these new biobased products originated with Dr. Lou Honary and his research team at the University of Northern Iowa's Ag-Based Industrial Lubricants Research Program. The cooperative is licensing the right to manufacture these products. To boost use, Iowa's state legislature passed a bill requiring state agencies to give preference to these industrial soy-based products running its state vehicles and equipment.
- More than 8700 Minnesota farm members collectively own 15 operating ethanol production plants in the state. Annually the plants turn 78 million bushels of corn into 200 million gallons of corn-derived ethanol. Backed by state legislation that sparked Minnesota's ethanol industry, currently 10 percent of the state's vehicle fuel is ethanol.
- Biodiesel, a fuel derived primarily from soybean oil, has been designated by the Department of Energy as an alternative fuel. In 1998 Congress enacted legislation that allows the use of B20—a blend of 20% biodiesel and 80% petroleum diesel—to meet Energy Policy Act of 1992 (EPACT) requirements. This clean-burning alternative technology offers similar power, fuel economy, and performance to petro-

leum-based diesel fuel. During 1999, more than 35 major fleets began using biodiesel to meet EPACT alternative fuel requirements, including 141 vehicles and equipment at USDA's Agricultural Research Station in Maryland. More than \$20 million in farmer checkoff funds, as well as research by USDA and other scientists, helped develop the U.S. biodiesel industry.

- Non-toxic Prang Fun Pro Soybean Crayons are made with natural soybean oil. Two students at Purdue University originated the idea while participating in the "New Uses for Soybeans" competition funded by the Indiana Soybean Board. Three years of work by a team of chemists, product developers, and marketers brought this concept to market.
- Two women farmers in Collins, MO, formed E. Elan Company to market their goat milk soaps and hand creams. All goat milk used in their product line is produced on their small farms. Natural moisturizing ingredients in goat milk make it useful for skin products. These entrepreneurs found a niche in the natural-ingredient personal care market and are doing well selling through specialty stores in several states and nationwide through a mail order catalog.

A Network of Science. Advanced technology transforms agricultural commodities into new chemical combinations and products. Research originates among a network of scientists in USDA's Regional Agricultural Utilization Centers, involved in biobased product development for almost 60 years; at the Forest Products Laboratory; throughout the land-grant university system; and in industry. Many technologies developed by USDA researchers have resulted in new multi-million dollar industries.

Technology Transfer. Federal and state university researchers can patent but cannot commercialize their inventions. They can license the right to commercialize technology developed with federal or state dollars to private companies.

Fruitful Partnerships. State research centers carry out biobased product research to find expanded markets for

commodities. Strong biobased programs exist at Michigan State, Colorado State, Iowa State, Kentucky, Oregon State, Purdue, Southern Mississippi, Kansas State, Nebraska, Minnesota, North Dakota State, and Northern Iowa universities.

Center research addresses state-specific agricultural problems. University of Kentucky researchers, for example, are investigating new uses for tobacco to help the state's depressed tobacco industry. Research activities include biochemicals, pharmaceuticals, fiber crops, and a device to convert cellulose to ethanol.

Producers, commodity organizations, and grower associations partner with university and industry researchers to develop new uses and expand markets for crops they promote. Farmer checkoff dollars fund research into commercial uses of members' farm goods. Some state departments of agriculture assist with new product development.

Biobased Infrastructure Development. Federal, state, local, and industry innovators are catching the biobased vision and partnering to build the needed infrastructure—new materials, processes, and processing facilities—for a biobased economy to flourish. In the future these processing technologies will use whole plants and other biobased materials to make many needed products. Now in its infancy, this infrastructure will take time to develop.

Risk venture capital for biobased products is limited, but federal agencies are stepping up biobased research and development (R&D) funding recommendations in 2001 budgets to accelerate biobased technology and product development.

Federal Tax Dollars Accelerating Biobased R&D. Federal activities are converging to accelerate the promotion, purchase, development, and use of biobased technologies to convert crops, trees, and other biomass into useful fuels and products for consumers and industry.

Two recent Executive Orders (13134: "Developing and Promoting Biobased Products and Bioenergy" and 13101: "Greening the Government Through Waste Prevention, Recycling, and Federal

Acquisition”) boost “green” product use and development. Bipartisan support for biobased products and biofuels is increasing in Congress. Several bills have been introduced to authorize biobased and bioenergy R&D monies in 2001 to accelerate the development of the biobased economy in America.

In his 2000 State of the Union Address, President Clinton said, “We must work together to ... create new markets for family farmers by expanding our programs for biobased fuels and products.”

USDA is a leader in research and development for the use of renewable agricultural resources. USDA and DOE are developing biofuel technology for “biorefineries” to convert plant feedstocks into fuels, chemicals, and electricity.

As the nation’s single largest consumer of products and services, with purchases accounting for 20 percent of the U.S. GNP, the federal government offers a huge customer base for biobased products. The Defense Logistics Agency in support of the Department of Defense expressed interest in buying biobased products that meet performance specifications set by the military for tactical vehicle and battle equipment use.

The National Academy of Sciences says that America’s abundant crop, forest, and animal resources warrant the rapid transition to alternative fuels and biodegradable, biobased industrial products.

Models for Biobased Product Development. At the federal level, USDA’s AARC program offered a viable concept to help small rural companies commercialize promising biobased research.

The Minnesota Department of Agriculture, the Agricultural Utilization Research Institute, and the University of Minnesota are developing an Agriculture Diversification Program to provide growers with critical information to evaluate opportunities and risks involved in growing, marketing, and processing new plants and animals.

Biobased Opportunities for Farmers. This new materials base for commercial and industrial products is increasingly demonstrating its economic potential by bringing jobs to rural America. The envi-

ronment benefits, too. Farmers are finding new uses for raw materials from agricultural and forestry resources—some of which were previously considered waste.

Small farmers can grow start-up phases of new industrial crops on 2- to 10-acre plots or contract with universities researching new industrial crop uses.

More opportunities for small farmers will occur as bioprocessing facilities locate in rural areas to crush beans for oils or make new fibers or materials from commodities grown locally.

Four biorefineries are now being built in North America. Three will convert cornstalks, sugar-cane waste fibers, or rice straw into ethanol. One will produce ethanol from sewage sludge and organic wastes from municipal garbage.

America’s energy independence from foreign energy sources increases as alternative fuels are developed from farm-raised plant sources by farmer-owned cooperatives or for-profit corporations. While pure diesel as a truck fuel is a long way off, mixtures of biodiesel and petroleum diesel are workable now. The National Biodiesel Board estimates that if just 1 percent of the agricultural diesel market were converted to biodiesel, 23 million soybean bushels would be used.

Industrial Crop Possibilities. New crops such as vernonia, euphorbia, and lesquerella hold promise as paint and coating materials. Soybeans, crambe, rapeseed, and canola can be used to make biobased fuels and lubricants. Kenaf and hesperaloe have industrial value for fiber products, including paper.

Guayule is being developed as a source for natural rubber and hypoallergenic latex, especially in the health care industry where latex gloves are in wide use. Oats can be used to make a chemical ingredient for plastics and synthetic resins and a solvent to purify lubricating oils.

Sunflower is used to produce resins for oil-based paints. Versatile flax provides fibers for linen and paper, industrial oils for household cleaners, chemicals for paints, and varnishes used in plastics. Vegetable oils and starches are used to make polymers.

Corn, sugarcane, wheat, and milo can

be used for ethanol or ethyl alcohol production. High-value crops for nutraceuticals—herbs with medical benefits in demand by the growing health care market—also hold promise for small farmers.

Beginning a New Product Venture.

Seek professional legal, financial, product development, and marketing advice. Make full use of expertise offered by the small farm coordinator or value-added specialist at your state land-grant university. To access directories, see the CSREES Small Farm Program website (www.reeusda.gov/smallfarm).

Identify a reliable market for alternative products. Start on a small scale to learn about a new crop or animal that is compatible with the local ecology. Ultimately, market success involves developing a reliable biobased product from raw materials in sufficient supply that performs under all conditions in which a petroleum-based product performs. The product must be priced competitively with comparable products made from non-renewable resources.

Considerations for Biobased Ventures—Pros.

- Unused land and by-products of U.S. agriculture and forestry could be put into biobased materials production.
- High-value industrial crops can be grown on small plots.
- Small farmers can do contract growing for universities’ new crop trials.
- Farmer-owned processing plants and marketing cooperatives are increasing.
- Cooperatives maximize resources and minimize personal risk in new crop or product ventures.
- Growing biobased materials stimulates diversification of feedstock sources for the U.S. industrial base.

Considerations for Biobased Ventures—Cons.

- Processing conversion technologies for many promising biobased materials are still in the development stage.
- Niche or alternative crops can be expensive experiments—they require new capital investment and are uninsurable.

- A plant breeding trial to bring a new industrial crop to optimal production may take time.
- Commercialization is the biggest obstacle to bringing potential biobased products to market. It will take time to lower the costs of producing and buying biobased products to the level of petroleum-based counterparts. Many consumers will pay 10 percent—but not 3 to 4 times more—to buy “green.”
- New products face challenges in market acceptance—breaking into established markets can take time. Companies may need to start a new product as a sideline to minimize risk.
- More start-up businesses fail than succeed each year.
- Cooperatives and domestic and international markets have ups and downs.

Summary. “In 1862 when President Lincoln founded the U.S. Department of Agriculture, his vision for America had agriculture as the foundation of manufac-

turing and commerce. Today petroleum is the foundation. The biobased revolution will return the American economy to Lincoln’s vision,” says Robert Armstrong.

SELECT WEBSITE RESOURCES

www.newuses.org

Includes new uses for renewable agricultural resources, legislation, bio-products directory, opportunities, events, briefing book, EverGreen newsletter, and other site links from the non-profit New Uses Council.

www.carbohydrateeconomy.org

The non-profit Institute for Local Self Reliance’s Carbohydrate Economy Clearinghouse provides information spanning all facets of the carbohydrate economy. The site offers a fully searchable database of more than 250 plant-based products, and the cutting-edge companies and cooperatives producing them, as well as reports, news headlines, and web links.

“Agriculture’s role will change from food, feed, and fiber to food, feed, fiber, materials, chemicals, fuels, pharmaceuticals, animal vaccines, and many other products now derived from petroleum.”

www.bioproducts-bioenergy.gov/

Gateway to what is going on in federal government relating to biobased products and bioenergy developments (Executive Order 13134), a biobased newsletter, and links to other biobased sites.

www.aaic.org/

Updates on industrial crop research, meetings, quarterly newsletter, and site links from The Association for the Advancement of Industrial Crops, an international non-profit educational and scientific organization.

Your Small Farm Neighbors

Brad Buck

Farmers and ranchers in Kiowa County in eastern Colorado are excited about a new economic opportunity developing in their remote area. Their newly formed for-profit corporation of sunflower growers, Kiowa County Growers, Inc. (KCGI), has signed an agreement with Agro Management Group (AGRO) to manufacture the company’s new biobased motor oil—AMG 2000.

The farmer-owned corporation is gearing up to produce ingredients not only for the biodegradable motor oil, but also for biodegradable drip oil for irrigation wells and dust suppressants for rodeo and equestrian rings—all from locally grown crops. The plant will process 20,000 acres of sunflower seeds into oil used to make AMG 2000.

“AGRO is a leader in the field of developing environmentally friendly plant-derived oils for industrial products,” explains Jim Lambert, CEO.

“As part of our company’s marketing

and developing strategy for our new biobased product line, we organize farmer-owned processing plants to manufacture the ingredients. Farmers are given a stake in building their rural economy around a new biomass technology by this way of partnering.”

AGRO is helping KCGI develop an oilseed processing plant similar to one developed in a prototype project helping soybean and canola growers in Michigan. A stock offering is in progress to raise money.

Brad Buck, a Kiowa County sunflower, wheat, and beef farmer, spends a lot of his time these days talking to neighbors about vesting themselves in KCGI. He believes in the cooperative principle.

“Cooperatives are the only way to do business in our small community of 1700 agriculturists,” he says.

When he meets with neighbors he shows them a business plan which lays out the economic potential of the new product. He explains how KCGI plans to successfully capture a share of the existing market and work out critical details



Brad Buck and family —PHOTO BY VIRGIL I. GRISWOLD

in undertaking this new product venture. The all-vegetable motor oil market is just now being tapped. KCGI will start selling AMG 2000 in the Colorado market, then go wider.

“You have to be persistent to set up a company involved in a completely new

venture or technology," says Buck. "Farmers are sometimes afraid to try something totally new because there is a risk and farmers have had some pretty rough years. Grain prices are too low for us to profit by just selling a bulk commodity. Value-adding is where we need to go, to be profitable.

"We just need to get past the idea of pumping a million-year-old form of

plant—oil—out of the ground to make our industrial products and realize we can use living plants we've grown all year on top of the ground instead," says Buck. "to understand the market potential for farmers offered by the emerging biobased economy."

Johnson's research at Colorado State University has yielded four other promising biobased products. That technology

will also be transferred to the Kiowa Growers Association processing plant for additional production opportunities.

Buck believes that farmers care about the environment. "When better biobased alternatives for farm inputs become available, I think farmers will make the right choice and use them," he says. "I know I will." ■

Small Farm Success Story CONTINUED FROM PG. 1

At AGRO's request, Johnson expanded his work on toasted canola seed oil to reformulate biodegradable bicycle chain oil, and by 1995 a small engine and car lubricant.

United Soybean Board and farmer checkoff funds provided initial funding for lab research and product advertising. AGRO obtained equity capital for research certification testing on the car motor oil to get the product commercialized through USDA's AARC. For their investment AARC required that the technology developed be transferred to a rural community to better its economy.

After 7 years of experimentation and an investment of \$25 million, AGRO patented AMG 2000. Production has started at a Michigan farmer-owned processing facility, and a similar Colorado plant will soon make the product. AGRO has hired a firm to establish industry testing standards for vegetable-derived motor oil.

"An industry partner is called a champion. We need champions to move promising research ideas out of universities and link new processing technologies with communities to produce new products. Without champions, no matter how remarkable the research and without the ability to make market penetration, the research will sit on a shelf," says Lambert.

The Michigan cooperative and processing plant started when a group of soybean and canola farmers asked county extension agent Jim LeCureux in Bad Axe, MI, to find a value-added opportunity for their crops.

The new vegetable-oil-based motor oil under development by AGRO was identified. In 1998, AGRO chose Ubly, MI, as the first farming community to involve as partners to produce AMG 2000.

To help set up Michigan's first farmer-owned contract cooperative, Thumb Oilseed Producers Cooperative, LeCureux, with a farmer steering committee, held 13 meetings with small farmers from six counties. Michigan State University gave him full support, even allowing LeCureux to serve as interim CEO until the plant was up and running.

Researchers at Michigan State University and Iowa State University provided some chemical expertise for the product. The Dakotas Cooperative Development Center gave technical assistance. Legal, financial, and marketing help was hired. LeCureux formed other co-ops and met with multi-state farmer alliances to build more economic opportunities for farmers in his region.

"You have to have a committed industry partner to make this work," says LeCureux, "and you need to work through a farmer-owned cooperative. Individuals run out of money, patience, skills, and other resources. A cooperative provides team support. The age of the independent farmer is over. The 21st century is the age of the interdependent farmer."

A for-profit corporation called Great Lakes Oil LLC was formed to manufacture and market the vegetable oil on behalf of AGRO. The partners are Thumb Oilseed Producers Cooperative, AGRO, and three county economic development agencies. The \$2.3 million

Thumb Oilseed Producers Cooperative crushing facility opened in July 1999 and converts locally grown soybeans into high-quality crude soy oil and meal and is the base of operations for Great Lakes Oil LLC at the present time where AMG 2000 is manufactured.

Customers for AMG 2000 include the U.S. Postal Service, Rail America, Michigan's Department of Agriculture, and others. To boost use, Michigan's legislature passed a House Resolution in 1999 urging state government agencies to give preference to biobased products in their equipment and fleets.

"Universities have a lot of research tucked away that no one is using and that could be put into commercial use if more research and development funds were available. Without venture capital, fewer biobased products will make it to market," says Johnson.

"Farm communities do not have access to this technology. That is where university research scientists can play a key role in working with industry and Extension partners to transfer technology that yields promising biobased products for regional production."

"There are so many wins along the chain for these products. And at \$34 a barrel for petroleum-based oil, interest is growing in our plant-derived motor oil alternative."

"AGRO has had calls from 90 percent of the farm states on this project," says Lambert. "We can't do this in every state, but we will do projects in two more communities. We need more champions." ■

A wide range of resources is available to assist small farmers and ranchers and their communities. Readers wishing further information about the resources listed below are asked to contact the individuals or offices listed for each item.



PRINT MEDIA

Building a Bio-Based Economy in the 21st Century. An overview of the history of the biobased movement in America, recommendations for attaining a biobased economy, and some companies that have developed products from biobased materials. Cost: \$30. To order, contact The Information Research Corporation, 214 SW 6th Avenue, Topeka, KS 66603-3719 (phone 785-296-3363; fax 785-296-1160; e-mail irc@kotec.com).

"The Carbohydrate Economy: Making Chemicals and Industrial Materials from Plant Matter," addresses the environmental and economic benefits of making industrial products from plant matter. Cost: \$25. To order, contact Katherine Mullen, The Institute for Local Self-Reliance, 1313 5th Street S.E.,



Minneapolis, MN 55414 (phone 612-379-3815; e-mail kmullen@ilsr.org, or website www.carbohydrateeconomy.org).

"The Carbohydrate Economy," a quarterly newsletter published by the Institute for Local Self-Reliance, provides in-depth coverage of new processing technologies, rural economic development, and new laws that impact the plant matter-based product industry. To order a 1-year subscription (4 issues for \$35), contact Katherine Mullen at phone 612-379-3815 or e-mail kmullen@ilsr.org.

The 2000 "Directory of Flower and Herb Buyers" lists 36 companies seeking to buy flowers, herbs, seeds, roots, and other botanicals, both wild-crafted and cultivated. Updated annually, the directory includes contacts. Cost: \$15. Order from Prairie Oak Seeds, PO Box 382, Maryville, MO 64468 (phone 660-562-3743).

Pollution Solutions is a series of fact sheets from the Institute for Local Self-Reliance about pollution prevention strategies using biochemical substitution and specific properties and uses of many biochemicals derived from agricultural crops. To order, contact Michelle Carstensen or Katherine Mullen at phone 612-379-3815 or e-mail kmullen@ilsr.org.

Pricing Nontraditional Products and Services (CIS 942). Written by L.D. Makus, J.F. Guenther, and J.C. Foltz, this 4-page 1992 fact sheet is a guide to cost-based, mark-up, demand-based, market-share, competition-based, cost-plus and market-share pricing. Cost: \$50. To order, contact Connie King, Ag Publications, University of Idaho, Moscow, ID 83844-2240 (phone 208-885-7982; fax 208-885-4648; e-mail cking@uidaho.edu).

Biobased Industrial Products: Research and Commercialization Priorities is a 162-page report overviewing the U. S. land resources available for agricultural production. Cost: \$35. National Research Council, National Academy Press, 2101 Constitution Ave, N.W., Lockbox 285, Washington, DC 20055; (phone 800-624-6242 or 202-334-3313; website: <http://www.nap.edu>).

A number of grant, loan, and training programs are available to support small farmers and their communities. Examples of such programs are summarized below. Readers wishing additional information are asked to contact the individuals or offices listed for each item.



GRANTS, LOANS, TRAINING

FY 2001 USDA Small Business Innovation Research (SBIR) Program Solicitation will open June 1, 2000, with an anticipated closing date of August 31, 2000. It will be available on the USDA SBIR website www.reesusda.gov/sbir.

The SBIR Program supports innovative R&D projects on all aspects of American agriculture and/or rural America. All small business owners, including farmers and ranchers, are eligible to apply. Proposals may be submitted in nine different topic areas: forests



and related resources; plant production and protection; animal production and protection; air, water, and soils; food science and nutrition; rural and community development; aquaculture; industrial applications; and marketing and trade. Projects focused on biobased products can be submitted to the following topic areas: development of wood-based products, development of agricultural-based products, rural impact, or marketing of biobased products.

For further information, contact Charles Cleland, Director, Small Business Innovation Research Program, USDA, STOP 2243, 1400 Independence Avenue, S.W., Washington, DC 20250-2243 (phone 202-401-5002; fax 202-401-6070).

USDA's Sustainable Agriculture Research and Education (SARE) Program offers grants to eligible applicants in four regions (Northeast, North Central, Southern, and Western).

Western Region SARE Program (AK, AS, AZ, CA, CO, FM, GU, HI, ID, MT, NV, NM, MP, OR, UT, WA, WY) will issue calls for proposals in summer with proposals due in fall for the SARE and Professional Development Programs and will issue a fall call for proposals with proposals due in mid-January for Farmer/Rancher Research Grants. Contact Western SARE, Utah State University, 4865 Old Main Hill Road, Logan, UT 84322-4865 (phone 435-797-2257; website: wsare.usu.edu).

North Central Region SARE Program (IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, WI) will issue a call for Research and Education pre-proposals in mid-July 2000 and for Professional Development Program proposals in early fall. Contact NC Region SARE, UNL, 13A Activities Bldg., Lincoln, NE 68583-0840 (phone 402-472-7081; website: www.sare.org/ncrsare).

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